Chemical Sciences Division (CHD)

Integrated Safety Management Plan (ISM)

Revised: December 2008

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Approved by: _____Date_____
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Chemical Sciences Division ISM

December 2008

Chemical Sciences Division
Integrated Safety Management Plan

1.0 Policy Statement

The Chemical Sciences Division (CHD) has implemented an Integrated Safety Management (ISM) program that meets or exceeds all of the standards described in LBNL institutional policy and procedure documents, including:

- Regulations and Procedures Manual (RPM) http://www.lbl.gov/Workplace/RPM
- Health and Safety Manual (LNBL/PUB 3000) http://www.lbl.gov/ehs/pub3000/
- The Integrated Environment, Health & Safety Management Plan (PUB-3140)
- Operations and Assurance Plan (OAP) http://www.lbl.gov/ehs/oap/oap_home.htm
- Work Smart Standards (WSS) set http://labs.ucop.edu/internet/wss/wss.html

The plan establishes the mechanisms and management strategies that will ensure that all institutional EH&S policies and procedures are properly implemented

2.0 Description of Division/ Organization, Mission and Scope of Work

Chemical Sciences Division (CHD) has 215 members including 17 administrative support personnel, 106 PhD scientists and 86 graduate students. 53 of the 106 PhD scientists are postdoctoral fellows. The division has 26 Principal Investigators, 14 of these are based primarily in the College of Chemistry on the UCB Campus while the remaining 12 are based on the LBNL site. Most of the research is performed by groups of students, postdocs, and staff scientists under the direction of a Principal Investigator (PI). Many PIs hold joint appointments at LBNL and the UCB faculty. The research groups operate in 4 different buildings at LBNL and several buildings on the UCB campus. The research groups based at LBNL and occupying CHD spaces are: Actinide Chemistry (Raymond, Shuh, Rao, Booth, Lukens, Durbin, and Gibson and the G.T Seaborg Center Program) in Building 70A; the Atomic Molecular and Optical Physics Group (Belkacem, McCurdy, Rescigno, and Weber) with spaces in Bldgs 2, 6, and 50B; the Chemical Dynamics Group (Leone, Neumark, Gessner, Ahmed, Wilson) which includes ALS Beam line 9.0.2 and laboratories in buildings 2 and 6; the Molecular Environmental Science Beam line 11.0.2(Shuh, Bluhm, Gilles and shared laboratory in building 6. Responsibility for EH&S covering CHD spaces on the ALS floor or the ALS Booster ring electron beamline is shared with ALS Division. CHD, as the majority tenant of Bldg 70A, has responsibility for the leadership of its emergency team. A large fraction of CHD's members and guests (about 60%) perform their research on the UCB campus and do little or no work in spaces belonging to LBNL.

Except where noted, this plan applies to work conducted in LBNL facilities but does not apply to work performed by CHD personnel on the campus of the University of California at Berkeley. In accordance with the *Partnership Agreement between UCB and LBNL Concerning Environment, Health and Safety Policy and Procedures (March 15, 2004)*, all campus CHD laboratories implement the ISM program via campus-based mechanisms with the assistance of the campus Office of Environment, Safety and Health.

Chemical Sciences Division Work on the University of California at Berkeley Campus

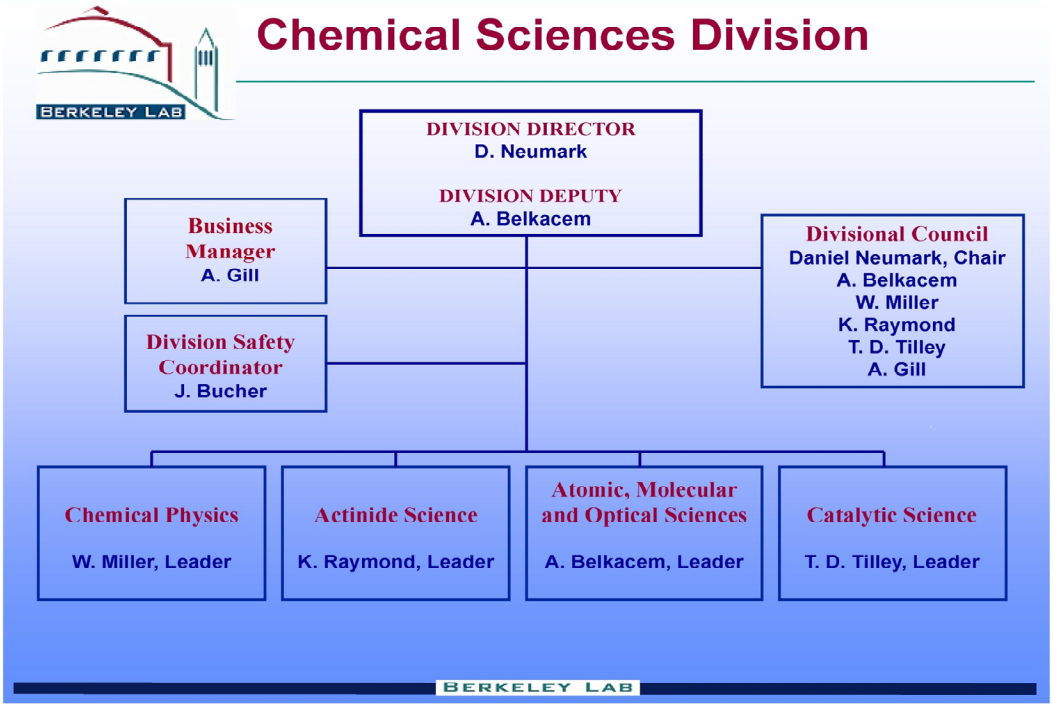
Work carried out on the UC Berkeley campus in spaces under the control of UC Berkeley will be carried out in accordance with the *Partnership Agreement between UCB and LBNL Concerning*

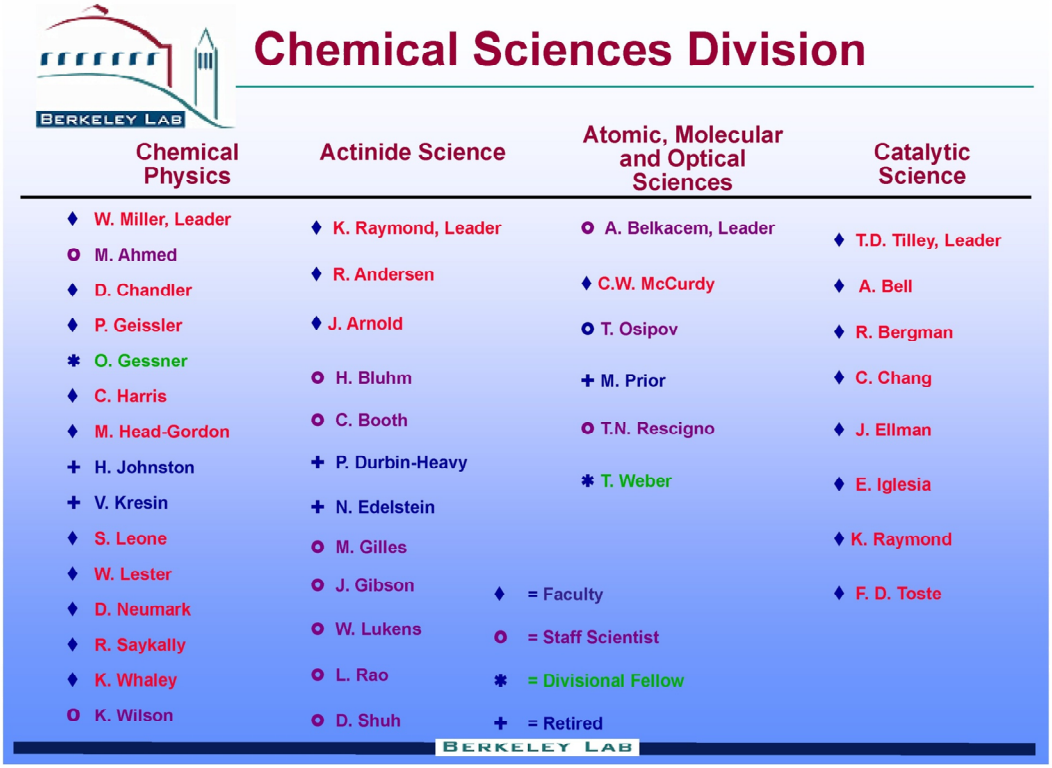
Environment, Health and Safety Policy and Procedures (March 15, 2004. This document delineates responsibility and oversight of safety requirements for work carried out in LBNL and campus spaces. It establishes a clear expectation that Berkeley Lab managers are expected to take the initiative in following locally applicable ES&H rules, and specifies that work carried out at LBNL, including Donner Laboratory, is carried out in accordance with LBNL rules, and that work carried out at UCB is governed by UCB rules. The Partnership Agreement is an appendix in the institutional ISM Plan (Pub 3140). It can be viewed at the following URL: http://www.lbl.gov/ehs/ism/App_G.html

- Lab PIs have an obligation to Berkeley Lab management to provide a safe workplace on campus for all Berkeley Lab-sponsored work. At UCB, this is satisfied by complying with the UCB Safety System.
- Lab PIs are responsible for analyzing work of persons under their direction and for assuring that the proper training for safe conduct of work is identified and obtained. Until an individual has been properly trained, s/he will work under the direct supervision of someone who is already trained. The type and method of training will be specified by the organization providing the ESH services or oversight to the space where the work will be performed.
- Lab PIs conducting Berkeley Lab-sponsored work are free to implement controls and other measures beyond the institutional requirements if they deem it appropriate.
- Lab PIs working at UCB can request a joint safety assessment (to be conducted by representatives of both the UCB and LBNL EH&S organizations) to further aid them in ensuring a safe workplace.
- Lab PIs conducting Berkeley Lab-sponsored work at UCB will provide an assurance that they have met UCB standards including properly specifying training requirements (for themselves, workers and students), obtaining and adhering to UCB work authorizations, and meeting UCB self-inspection requirements.

The requirements described in this ISM Plan apply, as appropriate, to faculty, staff, matrix staff, postdoctoral and graduate students, participating guests, visitors, users, vendors and contractors performing work under the management control of CHD.

Below are Chemical Sciences Division organization charts. Chart 2 shows the membership in each experimental discipline group. Names of principal investigators colored in red usually denotes UCB campus work location for their groups. However, Andersen, Leone, Neumark and Raymond have coworkers located at both UCB campus and LBNL locations. A. Gill and M. Holloway are supervisors for LBNL site administrative personnel.


Chemical Sciences Division
DIVISION DIRECTOR
D. Neumark
DIVISION DEPUTY
A. Belkacem
Business Manager
A. Gill
Division Safety Coordinator
J. Bucher
Divisional Council
Daniel Neumark, Chair
A. Belkacem
W. Miller
K. Raymond
T. D. Tilley
A. Gill
Chemical Physics
W. Miller, Leader
Actinide Science
K. Raymond, Leader
Atomic, Molecular and Optical Sciences
A. Belkacem, Leader
Catalytic Science
T. D. Tilley, Leader
BERKELEY LAB


Chemical Sciences Division
Chemical Physics
♦ W. Miller, Leader
○ M. Ahmed
♦ D. Chandler
♦ P. Geissler
✱ O. Gessner
♦ C. Harris
♦ M. Head-Gordon
+ H. Johnston
+ V. Kresin
♦ S. Leone
♦ W. Lester
♦ D. Neumark
♦ R. Saykally
♦ K. Whaley
○ K. Wilson
Actinide Science
♦ K. Raymond, Leader
♦ R. Andersen
♦ J. Arnold
○ H. Bluhm
○ C. Booth
+ P. Durbin-Heavy
+ N. Edelstein
○ M. Gilles
○ J. Gibson
○ W. Lukens
○ L. Rao
○ D. Shuh
Atomic, Molecular and Optical Sciences
○ A. Belkacem, Leader
♦ C.W. McCurdy
○ T. Osipov
+ M. Prior
○ T.N. Rescigno
✱ T. Weber
Catalytic Science
♦ T.D. Tilley, Leader
♦ A. Bell
♦ R. Bergman
♦ C. Chang
♦ J. Ellman
♦ E. Iglesia
♦ K. Raymond
♦ F. D. Toste
♦ = Faculty
○ = Staff Scientist
✱ = Divisional Fellow
+ = Retired
BERKELEY LAB

The Chemical Sciences Division conducts basic research in chemical physics and the dynamics of chemical reactions, catalysis, electron spectroscopy, photochemistry, atomic photochemistry, theoretical chemistry, atomic physics, and chemistry of the actinide elements.

Current CHD research programs at LBNL employ tabletop lasers, synchrotron end-stations, materials synthesis and processing laboratories, vacuum systems, wet chemistry labs and other required equipment and facilities. The PIs review the hazards associated with these operations annually, generally at the time of preparation of the FWP documents. The Safety Assurance statement signed by all PIs (including UCB campus based) indicates that this review has taken place and that proper training and procedures are in place to accomplish the work safely.

Research activities proposed in Field Work Proposals (FWPs), Work for Others (WFO) requests, Laboratory Directed Research and Development (LDRD) proposals and other research documents are reviewed for compliance with NEPA and CEQA by the Laboratory NEPA/CEQA coordinator. PIs are responsible both for identifying proposed research activities that have the potential for being hazardous and also for working with appropriate LBNL staff to assure that the research can be pursued safely prior to commencement of experiments or contractual commitment. In addition, each PI prepares EH&S documentation and obtains all required approvals for potentially hazardous or regulated work as defined in Chapter 6 of PUB-3000 prior to commencement of that work. Work that is currently carried out in CHD is regulated by Activity Hazard Documents (AHDs), Radiological Work Authorizations (RWAs) and Job Hazard Analysis Authorizations (JHAs).

3.0 Accountability

Employees, participating guests, contract labor, contractors, students and visitors are responsible for knowing and following the ES&H requirements that apply to their work. They are expected to work safely, determine which ES&H requirements apply to their work, and to cooperate with the division ES&H activities. LBNL/PUB 811, entitled, *"Integrated Safety Management for Employees, contractors, Participating Guests and Visitors: Handbook of Safety Policy, Requirements and Technical Guidance"* is a reference guide that has been prepared and made available by the EH&S Division through the Web at

http://www.lbl.gov/ehs/pub811/index.html.

Individuals performing work within the division/department are responsible and accountable for ensuring that all activities are carried out in a safe manner, and in accordance with all Berkeley Lab ES&H requirements. This responsibility and accountability cannot be delegated. All contracted work under division/department auspices must be accomplished in a safe manner by ensuring that qualified contractors/contract labor/service vendors are selected, hazards are identified, and work is performed safely within its assigned space. Individuals will need to consult with qualified specialists (e.g., division ES&H coordinators and EH&S Division staff) to resolve any questions about ES&H requirements. If there is any question about the safety or environmental impact of an activity, the work should be stopped and the issue(s) resolved before proceeding. The specific policy and procedure for stopping work is found in LBNL/PUB-3000, Chapter 1, Section 1.5 (Stopping Unsafe Work).

http://www.lbl.gov/ehs/pub3000/CH01.html#_Toc407015329

Division Safety Management Structure

The Chemical Sciences EH&S program structure consists of:

Division Director
Deputy Division Director
SRC Representative
EH&S Division Liaison
EH&S Waste Generator Assistant
Division Safety Coordinator

Principal investigators (PIs) and supervisors are responsible and accountable for implementation of this ISM plan in their labs and workplaces. The ultimate responsibility for implementing the ISM program cannot be delegated below the level of PI/supervisor.

3.01 Line Management Responsibility and Accountability

General requirements from Pub 3000 (1.3.2.5) for Supervisors, Managers, and Work Leads

Supervisors, Managers, and W ork leads are part of the safety line management chain from every Worker to the Laboratory Director. Supervisors and Managers are part of the formal management chain, and they have the responsibility for adherence to all EH&S policies and safe work practices. Work leads derive authority from formal Laboratory Managers and/or Supervisors to assure that day-to-day work, operations, and activities in their assigned area(s) and activities are conducted safely and within established work authorizations.
Supervisors, Managers, and Work Leads (by category) are to be specified in the Integrated Safety Management Plan for each division.

Safety Responsibilities of Supervisors, Managers, and Work Leads

- Ensure that the Laboratory's environment, health, and safety policies are being observed with the aim of providing conditions for conducting work safely.
- Ensure that the Job Hazard Analysis (JHA) documents relevant to the work, activities, and operations are completed.
- Take the initiative to consult with the appropriate support organization when safety related assistance or advice is needed.
- Assure that workers are properly trained in safety and emergency procedures, and that worker competence and on-the-job training are commensurate with their work assignments.
- Ensure that safety deficiencies identified through inspections and walk-arounds are entered into CATS and corrected in a timely manner.
- Ensure that before work begins that associated hazards and appropriate controls are identified, and the controls are implemented.
- Assure that appropriate authorizations are implemented and current.
- Promptly respond to reports of incidents or recommendations for ES&H improvements.
- Ensure that all materials and equipment, regardless of origin, applied in performance of the work of the Laboratory are used, maintained, and serviced in a manner that ensures the protection of environment, property, and health.

3.02 Specific Principal Investigator and 3.03 Work Lead EH&S Responsibilities

All Principal Investigators (LBNL and UCB-based) are responsible and accountable to the Division Director for ensuring that all activities are carried out in a safe manner and in accordance with all Laboratory or UCB EH&S requirements, as appropriate. PIs and Work Leads are responsible for a range of EH&S functions, including:

- Ensuring EH&S requirements are integrated into all work activities and the necessary resources/controls are provided in a timely manner to do the work safely
- Creating and communicating meaningful EH&S expectations and holding staff, students and guests accountable for implementing these expectations.
- Identifying the EH&S training requirements and medical surveillance requirements for their staff, students, guests and vendors and ensuring that training and medical evaluations are completed in a timely manner.
- Conducting semi-annual safety walkthroughs of labs (including the inspection described in the next bullet), offices and other workplaces for which they are responsible to identify problems in the facilities, equipment or work practices.
- Participating in annual lab inspections with the Division Director or designee, Division Safety Coordinator and EH&S Liaison.
- Ensuring preparation, maintaining and renewing required Formal Authorization Documents- (e.g., Activity Hazard Documents (AHD); Radiation Work Authorizations (RWA)).
- Managing the accumulation, storage and disposal of hazardous waste
- Ensuring that new or significantly modified projects or facilities are reviewed for hazards in the planning stage.
- Conducting periodic safety meetings with supervised staff, students and guests and/or incorporate safety content into regular group meetings.

3.04 CHD personnel EH&S Responsibilities (Non-Supervisor or Work Lead)

Guiding Principle: All CHD employees, students, contractors, and participating guests shall have the necessary technical skills, knowledge, training, personal protective equipment, and certifications required by law and by Laboratory policy to perform their duties safely and in a manner protective of the Laboratory's assets and the environment.

Reference in **Pub 3000 – Ch. 24**

All CHD personnel are expected to continue to implement Integrated Safety Management by:

• Planning and defining the scope of your work before you begin;
• Analyzing the hazards;
• Developing and implementing controls;
• Performing the work within controls; and
• Continuously assessing safety conditions, seeking feedback from safety staff, and making improvements as needed.

If you are asked to do anything you believe is unsafe or to work under unsafe conditions, you have the right and obligation to stop work.

All new employees, participating guests, students, visitors, and contractors must receive

basic ES&H orientation information prior to commencing work at LBNL. Everyone with a continuous appointment at the Berkeley Lab exceeding 30 calendar days, including participating guests, will complete a Job Hazards Analysis Questionnaire (JHA).
It is strongly advised for a new employee to complete this with the Supervisor, to make sure the employee understands his/her job duties. The employee's Supervisor is responsible for ensuring that the JHA is completed and that the employee's training status is reviewed as part of the annual performance review process. Each employee's safety performance will be measured against the requirements of this Plan during his/her performance review.
The output of the JHA process is a list of work activities, associated hazards and their controls including required and recommended safety training courses. Each employee's supervisor will ensure the required LBNL training courses are taken within 90-days of the JH completion (exceptions are for courses that are offered less frequently) EH&S 0010 (online computer training course), *Introduction to ES&H at LBNL*, must be completed within 30 days of hire). Depending on the job requirements, the supervisor may specify additional training, such as off-site courses and on-the-job training. Employees are responsible for completing required training within the required timeframe, and for updating the JHA annually or more frequently when a change in job duties occurs and completing additional training. If an employee has not completed required training, s/he must work under the direct supervision (line-of-sight) of a trained individual.
The Principal Investigator is responsible for task/hazard-specific, or on-the-job training that is not covered in JHA-generated training requirements for anyone working on the PI's project. The Supervisor should ensure that the employee is aware of this, and verify that the employee has received the required specialized training.

3.05 Students

Education and training of future generations is one of the University's missions and Berkeley Lab has a special responsibility to teach students to work safely. The Division ISM plan does not distinguish between students and other personnel working in the Division. Students are afforded the same protections and assume the same obligations with regard to EH&S as other workers at LBNL. Students must complete the same EH&S classes as staff.

3.06 Work Off-Site

Division line management and Principal Investigators have an obligation to be aware of the safety conditions and requirements their people (PIs, employees, students, or guests) may encounter while working offsite on LBNL projects. A hazard assessment should be performed for work other than attendance at conferences and meetings, such as laboratory, shop, industrial, or fieldwork. Where personal site visits are not practical, information can be obtained by discussions with safety and research personnel at the host site and the people who are working off-site. LBNL EH&S personnel will assist in the
assessment of hazards and controls.
All personnel working off-site are expected to continue to implement Integrated Safety Management by:
• Planning and defining the scope of your work before you begin;
• Analyzing the hazards;
• Developing and implementing controls;
• Performing the work within controls; and

• Continuously assessing safety conditions, seeking feedback from safety staff, and making improvements as needed.
Hazard controls should follow safety rules (LBNL or host site, whichever is stricter, except where LBNL requirements are prohibited or impossible to implement at the off-site location). If you are asked to do anything you believe is unsafe or to work under unsafe conditions offsite, you have the right and obligation to stop work and contact LBNL for guidance.
Discuss your training with off-site safety staff and ensure you have completed all required training to do the work. If the host site does not provide safety training for a work hazard, the LBNL courses for the work hazard should be completed.
Ensure that you are familiar with the emergency response and accident reporting procedures at the host site. If you become injured or ill during off-site work, first obtain any urgently needed first aid or medical treatment, then as soon as you can, call LBNL Health Services at 510-486-6266 to inform the Lab of your situation.

3.07 Telecommuting

Per LBNL policy, RPM 2.23(D)(5), telecommuting is a viable work option under certain conditions. Once a telecommuting agreement is officially approved, the employee's offsite work space must be maintained by the employee. EH&S facilitates telecommuting and remote location work by offering support services for LBNL employees using computers off site. Employees using a computer either at a remote location or telecommuting should take Web-based Remedy Interactive self-evaluation & training (EHS0059).

3.08 CHD ES&H Safety Coordinator

The general safety responsibilities for a Division Safety Coordinator are described in PUB-3000, Section 1.3.2.9. The CHD ES&H Coordinator reports to the Division and Deputy Director.
• Serves as a point of contact for all division employees regarding the implementation and interpretation of the Lab's ES&H policies.
• Serves as a member of the CHD ES&H Safety Management Committee.
• Consults and coordinates with the EH&S Division (and other) resources as needed.
• Promotes ES&H awareness, communication, safe work practices, and compliance within Chemical Sciences Division;
• Maintains familiarity with division hill workers, work activities and potential hazards.
• Ensures the division has a proactive ergonomic safety program which minimizes injuries.
• Oversees the coordination and management of required safety documentation, which includes:

- Preparing and/or reviewing the CHD ISM Plan, CHD Self-Assessment Report, Supervisor Accident Analysis Reports (SAARs), Activity Hazard Documents (AHDs); Radiological Work Authorizations (RWAs), Sealed Source Authorizations (SSA), X-ray use Authorizations
- Monitors the status of records and takes measures to improve performance in Job Hazards Analysis Questionnaire (JHA) and training completion, corrective action completion (CATS), chemical inventory maintenance(CMS), hazards management review(HMS), laser inventory maintenance, hazardous waste management, and ergonomics;

• Inform the Division Director of audit/ assessment findings and other opportunities for improvement, and recommending changes to improve performance;
• Initiating reviews for first aid and Occupational Safety and Health Administration (OSHA) recordable injuries and other significant incidents by organizing the review team and scheduling review activities. Supporting the supervisor in the review process by facilitating interviews, advising the Supervisor on the completion of the Supervisors Accident Analysis Report (SAAR), and working with the review team to facilitate Tap-Root Analysis completion of the Investigation Report for recordable injuries, as described in **PUB-3000, Section 1.5**; and
• Serves as a division point of contact for Occurrence Reporting (ORPS), assists in the notification, recommended categorization, investigation, mitigation, and report preparation of all reportable occurrences within the division as described in **PUB-3000, Chapter 15**.

3.09 Vendors

Each vendor is associated either with a staff scientist, or a fully trained and qualified student, or a principal investigator or a building manager, any of which will constitute "line management" with respect to the vendor and is responsible for ensuring that the vendor works in accordance with all applicable EH&S requirements as listed in PUB-3000, chapter 31.

3.10 Shared Lab Space and User Facilities

The scientist responsible for lab facilities (at LBNL) that are shared with individuals outside his or her research group is responsible for ensuring that the guest/user has been fully trained and complies with applicable EH&S policies. The lab manager may provide required "on the job training", or the line manager or others may provide this training, but it is the lab managers' responsibility to prohibit work from proceeding until training has been completed. This applies equally to user facilities and labs that are informally shared. The Division requires guests to follow the same EH&S procedures and requirements as staff and students. Only the host/assigned scientist can authorize work to be performed by the guest.

3.11 Matrix Employees/Employees Working in CHD Facilities

Matrix employees' supervisors from their home division retains all health and safety responsibilities for matrix employees, except when agreed upon responsibilities have been transferred to the Division through a formal Memorandum of Understanding (MOU). CHD personnel may require and provide operation-specific training to matrix individuals.

4.0 Communication and Feedback

4.01 CHD employs a variety of tools to facilitate communication of EH&S issues.

- Division Safety Management Committee–Deputy Division Director, CHD Safety Liaison, CHD Safety Coordinator, Laboratory Safety Review Committee Division representative and one other PI (Kevin Wilson) meet monthly to review Division EH&S performance and incidents, discuss problems and support the LBNL self assessment processes.

- Research Group Meetings–Each PI meets with members of his or her research group and EH&S topics must be discussed at the beginning of each group meeting at least quarterly or preferable weekly, biweekly or monthly.
- Annual "All-Hands" meeting–An "All-Hands" meeting is held annually either on the LBNL site or a UCB campus site. Division PIs are expected to attend this important meeting. Chemical Sciences Division EH&S performance and a prospective look at initiatives for the coming year is presented.

4.02 Assurance Mechanisms
The Division has implemented a variety of EH&S assurance mechanisms, as described below.

4.02.1 Project Hazard Guide
CHD utilizes a "Project Hazard Guide" that facilitates the hazard evaluation of work in laboratories. Central to this process is the Project Hazard Guide Questionnaire, which is completed annually by each CHD PI at the time of FWP submission. The form currently lists 41 potential hazards likely to be present in Division work. The responses on the questionnaire are reviewed by the Safety Coordinator. Positive responses are used to target hazard evaluations and inspections of research operations which may require formal authorization or present hazards above the ordinary

4.02.2 EH&S Component of Performance Appraisal
LBNL staff scientists receive annual performance appraisals. An important part of their assessment is based on their EH&S performance, including their performance in inspections, assessments and reviews conducted during the appraisal year.

4.02.3 Affirmation
All PI's (LBNL and UCB) confirm their EH&S responsibility at least annually through their signature on the CHD Safety Assurance Statement (SAS) which is required for all proposals processed through CHD. The text of this document used in 2008 is given below.

"I have reviewed the impact of the component of the research described in this proposal that will be performed in my laboratories under my direction on the environment and on the health and safety of the staff, students and visitors who will do the work.

I assure that proper procedures, equipment, and facilities will be employed and all staff appropriately trained to carry out this work consistent with applicable environmental regulations.

1. Proper procedures, equipment, and facilities will be employed and all staff will be properly trained to carry out this work in a safe and environmentally benign manner. In determining that all the procedures, permits, authorizations, and/or approvals required for my new and ongoing projects are in place I consulted with LBNL Pub 3000, the MSD Project Hazard Guide, or UCB safety guidelines as appropriate."

5.0 Authorization of Work

5.01 Formal Authorization

Approximately 40 Division operations (on the LBNL site) are formally authorized via Activity Hazard Documents (AHDs), Radiological Work Authorization (RWAs), Radiological Work Permits (RWPs), Sealed Source Authorizations (SSAs), X-Ray Authorizations, or other institutional mechanism. These authorizations are contracts between the PI, the Division and the institution that bind the PI to a set of safety conditions and requirements. These contracts are inviolate; if the PI or others working in the lab cannot meet the conditions of the work authorization then work must be suspended until changes can be made in the work, controls or authorization document.
PIs are responsible for recognizing when they are planning work that requires formal authorization and obtaining that authorization prior to starting work. The institutional triggers for formal work authorization can be found in Pub3000, the CHD Project Hazard Checklist. An excellent survey of understanding authorizations and implementing ISM in general is available: slides from MSD/EHS026 "ISM for PI's and Supervisors" class found online at http://www.lbl.gov/msd/msd_safety/assets/EHS_26_MSD.pdf
Individual principal investigators prepare AHDs. Principal investigators may appoint work leaders to assist in the preparation and maintenance of their AHDs, but they may not delegate their responsibility for these actions. AHDs are initially authorized by the Division Director or his/her designee, PI, Division Safety Coordinator, EH&S Liaison, EH&S Subject Matter Expert and annually reauthorized by the Facility/EH&S Manager, Safety Coordinator and PI. If the scope of work changes substantially, resulting in increased hazards, the AHD needs reauthorization. Official copies of all AHDs are found in the on-line AHD database.
Maintenance of formal work authorizations is the responsibility of the PI. The PI must update his or her AHDs at least annually or immediately, whenever the work changes such that new hazards are involved. All researchers, including users and guests participating in research that is authorized via an AHD must be added to the electronic AHD before starting work (does not apply if the guest is not actually performing potentially hazardous work; does not apply for up to 30 days during which the user is under line-of-sight supervision by a trained individual). For the radiological authorizations (other than X-Ray), it is necessary to notify EH&S in advance of new or short term users, guests or students.

5.02 Job Hazards Analysis (JHA)

CHD supervisors will implement the Job Hazards Analysis (JHA) requirements described by **PUB 3000, Chapter 32** and any further institutional guidance following the pilot test, which will conclude on September 30, 2008. At a minimum **Individual Baseline JHA** will be completed by each worker, authorizing regular and routine work. In addition, every worker may belong to one or more work group JHA(s). These tailored JHAs can automatically authorize work that is not necessarily included in the Individual Baseline JHA. The JHAs must include all work that is more hazardous than that commonly performed by the general public, the control of which requires little or no guidance or training to perform the work safely. Each worker must complete his/her Individual Baseline JHA within 30 days of initial appointment to LBNL, and review/update Individual Baseline and work group JHAs at least annually from the date of authorization, and as the job changes significantly. If a worker does not have a JHA authorizing the work, he/she may perform work that has been analyzed for someone else, provided that he/she is under the direct, line-of-sight supervision of that person, and that person has been trained and authorized to perform the described work. Both parties must adhere to the controls specified for that work.

Training is available in a number of ways, including:

- On-line at the EH&S Training Web Site
- Via attendance at class
- By supervisor exemption. (A supervisor may exempt ("waive") an employee/guest from a required training class. The supervisor certifies on the JHA profile that the employee/guest has already been trained for a particular hazard by a combination of prior experience [includes training classes taken at other institutions] and/or on-the-job training.)
- Most importantly, on-the-job training is provided by supervisors, managers, and/or work-leads.

5.03 Line Management Authorization

Work that falls below the threshold for formal authorization is authorized by the principal investigators/supervisors/work lead. Completion of a baseline JHA and/or work group JHA is the principal tool for indentifying and authorizing the scope of work.
The Project Hazard Guide Questionnaire is another mechanism that is used to confirm properly authorized work. The answers to this questionnaire, supplied at the time of Field Work Proposal (FWP), are reviewed by the Division Safety Coordinator and the Division Director or his designee, to ensure that work authorizations are appropriate and to target any further needed hazard assessment activities.

5.04 General Duties

Routine general duties, such as office work or routine shop work not requiring formal authorization, are authorized by the employee job descriptions, by their individual base JHA, by completion of Training requirements generated from the JHA and any additional training as determined necessary by the supervisor.

6.0 Inspections and Assessments

6.01 Satellite Accumulation Area (SAA) Inspections

The EH&S Waste Generator Assistant and the CHD Safety Coordinator will conduct a quarterly comprehensive review of the satellite waste accumulation areas (SAAs) in the Division.

6.02 Institutional EH&S Databases

CHD participates in the management of Division data in the following institutional EH&S Databases:

- Chemical Management System (CMS)
- Supervisors Accident Analysis Report (SAAR)
- Hazard Management System (HMS)
- Corrective Action Tracking System (CATS)
- Job Hazards Analysis (JHA)
- Laser inventory Database
- Activity Hazard Document database (AHD)
- Radiological Work Authorization (RWA)
- Radiological Work Permits (RWP)

- Sealed Source Authorization (SSA)
- X-ray Authorizations and Permits
- Biological Use Authorizations (BUA)

6.03 Safety Walkthroughs

Safety walkthroughs are performed to observe work, inspect the workplace, and talk with the employees about the safe performance of work. The walkthroughs serve the purpose of proactive accident prevention and promotion of safety and health awareness among staff members and demonstrate the importance that Line Management attaches to safety.

Who	What	When	Where	Why
Division Director & Deputy	**Executive Safety Walk-around**	**Twice yearly**	**Sampling of division spaces**	**Discussion with employees in their workplaces. Inspection to verify safe working conditions.**
Supervisors or Work Leads	**Safety Walk-around**	**Twice yearly**	**Work spaces**	**Inspect the safe work conditions and compliance with safety requirements.**
Supervisors or Work Leads, Safety Liaison, Safety Coordinator, and Division Line Management Representative	**Divisional Self-Assessment and Walk-around**	**Yearly**	**Work spaces**	**Inspect the safe work conditions and compliance with safety requirements**

EH&S0027 – "Performing an Effective Walk-around" training is a required class for walk-around designated persons.

Supervisors/work leads are responsible for formulating their own walk-around plans and schedules and discussing these plans, reviews, and results with their respective supervisor and direct reports. Supervisors are encouraged to share walk-around observations and findings with their peers during safety meetings to increase knowledge and promote improvement.

Supervisors/work leads conducting formal walk-arounds will document the conditions and criteria employed during the course of their walk-arounds, and maintain their documentation in a form suitable for independent inspection.

6.04 Annual Self-Assessment Inspection

At least annually, the CHD EH&S Manager, CHD Safety Coordinator and CHD EH&S Liaison and the PI will conduct a joint inspection of each CHD LBNL laboratory. In preparation for the inspections checklists will be completed by the laboratory users for each laboratory and/or project. The completed forms will then be delivered to the PI for approval. The checklists will also be used as a basis for conducting the annual inspection of LBNL located laboratories. Approved checklists will be retained by the Safety Coordinator. Inspections of LBNL Divisional Offices will also be inspected annually using a checklist specifically prepared for assessment of administrative environments. For LBNL labs the CHD Safety Coordinator or designee will document these joint inspections and track items that cannot be immediately corrected in the CATS database.

6.05 Triennial Management of Environment, Safety and Health Assessment (MESH)

As required by the SRC, the Division will participate in the MESH review that evaluates management systems and implementation of ISM requirements. This review is run by the Safety Review Counsel and typically includes representatives from the Office of Contract Assessment (OCA) and EH&S Division. CHD completed the MESH review in 2006.

6.06 Technical Assurance Program (TAP)

For some time, the Division has participated in the triennial Integrated Functional Appraisal (IFA) reviews. This was last conducted in CHD in 2006, and involved a review of each formal authorization document. The IFA approach is gone and is replaced by EH&S Technical Assurance Program (TAP). CHD will participate as requested in this new program.
TAP assessments include regular inspections of the workplace, work activities, and facilities. Assessments also include reviews of documentation such as ES&H program documentation, training activities, formal work authorizations, hazardous work permits, external assessments, and relevant databases [Corrective Action Tracking System (CATS), Activity Hazard Documents, Job Hazards Analysis, Chemical Management System, etc.]. The primary elements of ES&H technical assurance assessments are:

- Regulatory compliance
- Formal authorization compliance
- Program and process implementation effectiveness (including safety culture, support and issues with implementation throughout CHD)

• Issues documentation via the CATS database
• Corrective action effectiveness
• Lessons Learned effectiveness

Systematic assessments of the technical ES&H programs and processes provide the division and EH&S a basis on which to direct resources for improved ES&H performance.

Consult:
http://www.lbl.gov/DIR/OIA/assets/docs/OCA/OCA_ESH/ESH%20Technical%20Assurance%20Program%20Manual%20R0%20Final.pdf for further information.

6.07 Injury and Illness Reporting, Tracking and Analysis

Incident Investigation

All accidents that occur within the Division shall be thoroughly investigated to prevent recurrence. The Safety Coordinator will assist the Supervisor to form an incident review team, which includes the affected or injured employee, the employee's supervisor, the Safety Coordinator, and the EHS Division Liaison. For OSHA-recordable accidents, root-cause analysis will be performed by a trained professional who will be included in the review team, along with any EHS Division Subject Matter Experts as needed. All safety and health incidents are discussed by the Division Safety Management Committee. The Division Director is notified of all OSHA-recordable accidents.

The Division Safety Coordinator tracks injuries and ensures a Root Cause Analysis for each recordable injury is performed. Analysis is directed to determining areas that need improved safety processes and/or procedures. Corrective actions are entered into CATS.

A "near miss" is an unplanned event that did not result in injury or damage but had the potential to do so. Only a fortunate break in the chain or events prevented an injury, fatality or damage. Reporting of near misses by observers is an established error reduction technique in many industries and organizations. With the goal of continuous improvement Chemical Sciences Division is implementing a Near Miss Safety Program. Employees are encouraged to inform CHD of near misses. Reporting is done using a form available from the division office or at several locations outside CHD labs.

7.0 Training

LBNL Policy states that:

New employees, participating guests and students should complete required institutional training within 90 calendar days of starting employment. Until training is completed, new employees, participating guests and students can work only under the direct, line-of-sight supervision of an employee who has completed the required training.

- Employees, Guests, Students, Contractors with appointments of 30 calendar days or less are not required to complete most institutional EH&S training and do not need to fill out the Job Hazards Analysis (JHA).
- "Occasional Guests, Students and Contractors" are not required to complete institutional training but must be under constant, line-of-sight supervision by a trained individual.
- Training specified in formal authorization documents must be completed prior to starting work.
- All Employees, Guests, Students, and Contractors are required to complete General Employee Radiation Training (GERT).

- All LBNL located Employees, Guests, and Students are responsible for taking the online course: EHS010- Introduction to EHS at the LBNL.
- After 30 days, all individuals must complete the JHA to facilitate the identification of training requirements. Individuals should complete the required training prior to 90 days before starting/continuing work for which training is required. This grace period may be reduced at the discretion of the PI/Work Lead.

7.01 Supervisor Training

1. All division supervisors are required to complete EHS026, "ES&H for Supervisors".
2. Group leaders and supervisors are required to complete EHS027, "Performing an Effective Safety Walkaround".

7.02 Work Lead Training

1. All division work leads are required to complete EHS033 – "Safety Implementation Workshop for Work Leaders-Research Laboratory" – unless they have already completed EHS026, "ES&H for Supervisors".
2. Work Leads are required to complete EHS027, "Performing an Effective Safety Walkaround".

7.03 Ergonomic Training

1. All Chemical Sciences employees and guests located and working at the LBNL-site are required to complete EHS059, "REMEDY" – interactive web-based ergonomic self-assessment and training course annually.
2. Employees may be required to complete an Ergonomic Workstation Evaluation based on the risk result assigned by EHS059, "REMEDY" - interactive web-based ergonomic self-assessment and training.
3. Employees that perform lifting activities, that meet the JHQ/JHA requirements, are required to complete EHS062, "Work Smart Ergonomic training".

7.04 Medical Surveillance

Few LBNL personnel are required to participate in a medical surveillance program. The common exceptions are:

- Laser Eye exam (EHS 288): Must be completed prior to working on a class 3b or 4 laser system unless under direct line-of-sight supervision by a PI or fully qualified individual designated by the PI.
- Respiratory protection medical review: Must be completed prior to starting work where a respirator is required.

8.0 Reporting Employee Concerns

A variety of formal communications methods have been established at Berkeley which enable division employees to report environmental health and safety concerns or safety suggestions. Employees may file a concern directly with their division director, principal investigator or division safety coordinator, as well as seek assistance from, EHS Liaison, EH&S Suggestion Box, EH&S division, the Laboratory Ombudsman or the Department of Energy. Persons reporting hazards or improper activities are fully protected by the law and Lab policy against retaliation.

The available reporting mechanisms include:

LBNL Safety Concerns Webpage	**http://www.lbl.gov/ehs/refs/safety_concerns.sthml**
LBNL Internal Whistleblower Hotline (24 hr. voicemail)	**1-510-486-6300**
U.S.DOE Employee Concerns Program Hotline (24hr.)	**1-800-701-9966**
EthicsLine (24 hr., third party administered; confidential)	**1-800-999-9057**
University-wide Hotline	**1-800-403-4744**
California Bureau of State Audit	**1-800-293-8729**
EH&S Suggestion Box	**hhtp://ehswprod.lbl.gov/mis/suggestions/suggestionForms.asp**
Laboratory Ombudsman	**Harry Reed H_Reed@lbl.gov , http://www.lbl.gov/Workplace/Ombuds/**

9.0 Balanced Resources

9.01 Integration of Safety into Project Planning

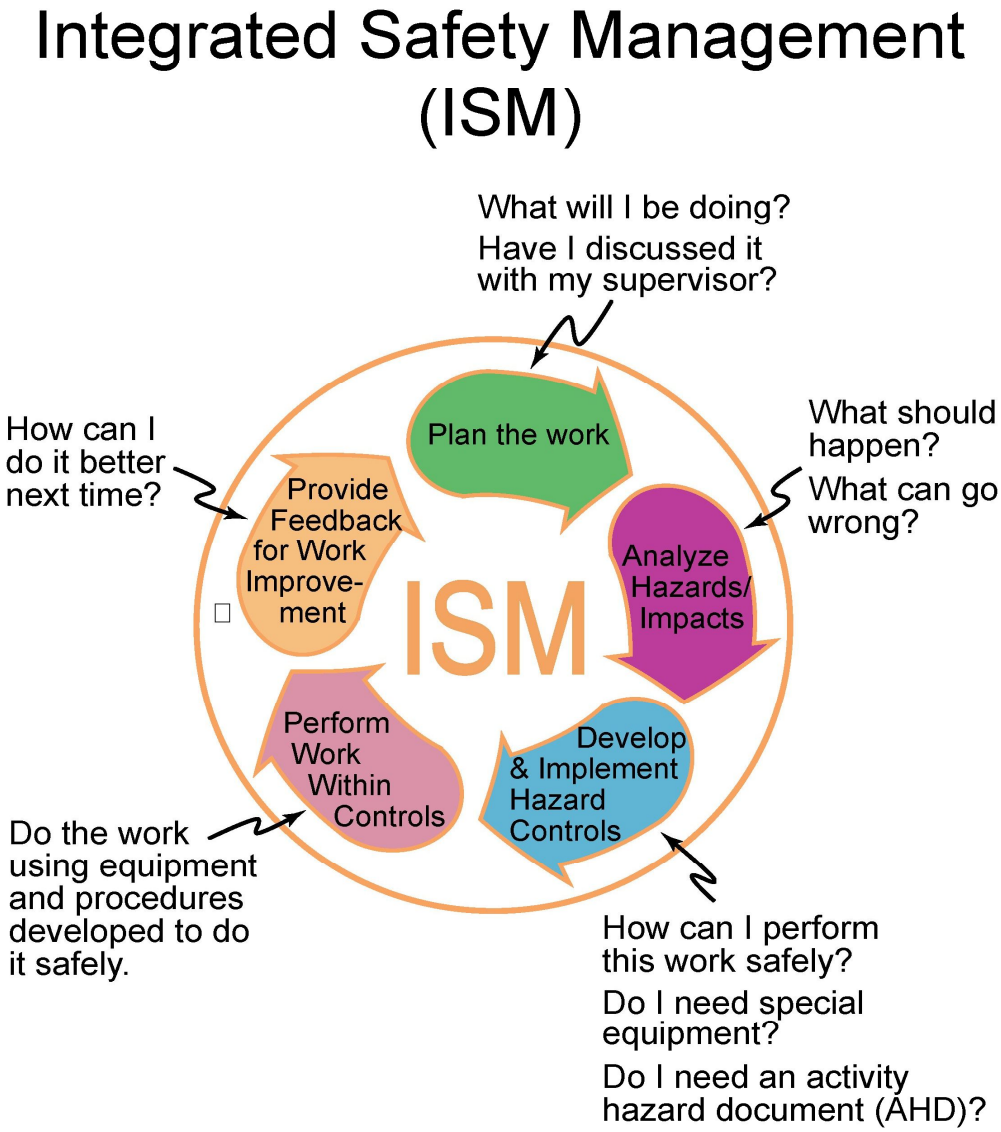
PIs will incorporate appropriate resource allocations for EH&S-related activities into all research proposals, including costs of safety equipment, permits, training, maintenance, waste disposal, and facilities modifications, unless these costs are covered by institutional funding sources.

9.02 CHD Use of Safety Resources

The following resources are allocated to ensure implementation and execution of the CHD Division Safety Plan: CHD Safety Management Committee (0.05 FTE) and the CHD Safety Coordinator (0.4 FTE). The CHD Deputy is, in part, responsible for oversight of Division Safety performance (0.10 FTE). Baseline support from EH&S Division comes from the areas of Laser and Radiation Safety, Waste Generator Assistance, Industrial Hygiene, Fire Protection, Occupational Safety, Emergency Services, and Environmental Protection. Services consists of laser safety, chemical waste pickup and disposal, chemical safety, training classes, assistance with the annual Self Assessments and other inspections, and advice on the design of new laboratory spaces. It is estimated that 0.95 FTE total of EH&S effort is required for these activities.

Appendix A.

Below is a cartoon developed by Chemical Sciences personnel illustrating the FIVE ISM Core Value components in the circular cyclic pictorial representation of ISM.



Appendix B.

Below is a description taken from the Engineering Division of how to apply the Five ISM CORE values to all work done by Chemical Sciences members.

Expectations and Actions for All Chemical Science Members

All CHD Staff members, and Students are expected to take the following actions:

1. **Define the work** with your supervisor/work lead (PI) and share the plan with your co-workers/group
    a. Identify and discuss the scope, task sequence, and steps. Plan for contingencies and reversions.
2. **Perform continuous hazard/risk assessment** of task and scope. A critical element of ISM is figuring out what can go wrong. All work requires some form of hazard, risk, or impact analysis.
    a. Prejob and routine safety walk-arounds and briefings are one way for every group member to know and communicate what hazards, risks, and impacts have been identified – prior to beginning the job.
    b. Things change constantly; therefore, habitually performing hazard, risk, and impact analysis is one way to identify and control risk
    c. Keep JHA current
3. **Control Hazards, risks, and impacts** - eliminate whenever possible.
    a. For every hazard and risk that has been identified, action must be taken to eliminate or control the risk. Actions can include the use of safety glasses, equipment guards, interlocks, or use of a procedure checklist.
    b. Keep required training, certifications, and authorizations current. The individual(s) performing the work must possess the requisite skills, training, experience, knowledge, and required certifications.
    c. Self-check of personal physical and mental readiness to perform the work.
4. **Perform the work**
    a. Doing the work as planned and within controls.
    b. Continually monitor changes that may introduce a hazard or risk.
    c. Stop work at any time – especially if steps #1 through #3 have not been completed – or if circumstances change.
5. **Ask for, and share feedback**.
    a. Identify procedures, practices, tools, or equipment that can be adjusted or improved.
    c. Update and discuss practices, procedures, controls. In addition to the above actions, line management, consistent with their supervisory role and management accountability, are to perform the following:

Expectations for Line Managers

1. CHD line managers (PIs) retain authority to assure their supervised workers follow safe practice and procedures
2. Determine and authorize work, after discussion with co-workers.

3. Assign qualified personnel to perform work who have the appropriate skills, training, experience, and required certification.
   a. Verify required safety training is identified (JHA profile), completed, and current (Training profile).
4. Perform hazards/risk/impact assessment of planned work as well as workplace conditions.
   a. Perform routine safety walkarounds as appropriate to assess safety performance, while soliciting and providing feedback
5. Stop work if safety concerns arise; support the responsibility of employees to stop Work
6. Within a matrix arrangement (e.g., Heavy Element Research Laboratory), the Chemical Sciences line supervisor will review safety considerations with the matrix (non-CHD) supervisor and employee.

Additional Expectations for Deputy Division Directors

1. Use reasonable management judgment to assess the use of the ISM by line managers and employees.
2. Advocate use of ISM within their management lines.

Additional Expectations for the Division Director

1. Develop initiatives and expectations for each deputy that promote safety as a core Value.
2. Advocate use of ISM within the Division.

Appendix C. Chemical Sciences Division Personnel Protection Equipment (PPE) Policy:

Introduction
All personnel in CSD laboratories will wear safety eyewear or when appropriate laser goggles at all times while they occupy laboratory areas, unless established otherwise at the laboratory entrances. In addition closed toed shoes and long pants are required.

Supervisors and Work Leads are responsible for re-evaluating PPE requirements whenever the work or the physical layout changes.

Area PPE requirements must be established for all laboratories and work areas where chemical and biological materials are handled or stored. The minimum PPE requirements must be posted at all entrances to the area. Where chemicals and biological materials are handled and/or stored and there is a potential for exposure to personnel, the minimum PPE required is safety glasses with side-shields, chemical resistant gloves, a lab coat and closed-toed shoes.
Persons transiting a laboratory or touring visitors are exempt from wearing lab coats and gloves, but they must wear eye protection. A person, under escort, transiting the Heavy Element Research Laboratory (HERL, 70A-1129, 1145, and 1149) is not exempt from the requirement to wear a buttoned lab coat. LBNL policy for eye protection and foot protection follows Chapters 19.3- Foot Protection and 19.6- Eye protection in Pub-3000.

Cleaning the surfaces of mounted optical parts in a CHD laser/spectroscopy laboratory by using less than a milliliter (usually approximately 30-50 microliters) of (preferably) ethanol or acetone in combination with cleaning tissue held in a suture clamp and using a wipe technique, does necessitate wearing a lab coat. Safety eyewear and chemical resistant gloves are also mandatory.